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DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

RANGELAND MONITORING

PLANNING FOR MONITORING

TECHNICAL REFERENCE 4400-1

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RANGELAND MONITORING - PLANNING FOR MONITORING

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1. IDENTIFYING NEED FOR MONITORING.

Monitoring studies should be conducted at a level consistent with identified need. The basic need for rangeland monitoring in the Bureau of Land Management (BLM) is identified by the objectives which originate in land-use plans and are established in final decisions made by the authorized officer. Management objectives from land use, coordinated resource management, and activity plans establish a framework and criteria for determining the level of intensity and reliability desired for monitoring. In general, areas with significant resource conflicts, controversy, or potential for improvement may require more intensive monitoring. In many instances, it may be necessary to weigh monitoring needs against the requirement for a cost- and time-efficient monitoring program within funding and personnel constraints.

2. COORDINATION.

2.1 Coordinating Inventory and Monitoring. Inventory and monitoring programs should be coordinated within an area to provide for the most efficient collection of the data needed and to ensure the greatest utility of the data. Inventory and montoring data collected on an area should be complementary.

2.11 Inventory as a Basis for Monitoring. Baseline inventory data needed to establish a basis for a rangeland monitoring program consist of an Order 3 soil survey, mapping of vegetation types and range sites, and other renewable resource information. These baseline or basic resource data include: the description, classification, productivity, properties, and mapping of kinds of soil; range site descriptions; site potential; and present vegetation. The vegetation inventory should provide sufficient production data to make a reasonable estimate of the current ecological status. These data provide a base for stratifying allotments, wildlife habitat areas, herd management areas, watershed areas, or other designated management areas. (See Section 5.11.) Where baseline inventory data are not available, existing data should be used as a basis for a monitoring program.

2.12 Using Inventory Methods for Monitoring. Methods for collecting inventory data may be used for monitoring studies. Where inventories have been completed, existing inventory data may be the starting point for monitoring. Where inventories are scheduled, plan for the collection of data needed to initiate monitoring or to complement monitoring data already being collected.

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2.2 Interdisciplinary Coordination. Monitoring programs should be coordinated closely to ensure all facets of multiple-use management are considered. This prevents duplication of effort and ensures a free flow of information among resource programs. Coordinated monitoring plans provide for integrated data collection necessary to assess the effectiveness of on-the-ground management actions and to determine progress in resolving resource problems and conflicts and meeting management objectives. The interdisciplinary coordination efforts should be documented. If specific monitoring studies are needed for program management (e.g. wildlife, forestry, wild horses, and wild burros) they should be established by those programs.

2.3 Inter-Area/District/State Coordination. Ongoing and future monitoring programs should be coordinated with adjoining areas, Districts, and States. This coordination should address the similarities and differences between the programs with regard to study methods, training, studies schedules, consultation, cooperation, coordination with rangeland users and other interested parties, and the evaluation format and schedule. Coordination facilitates the common evaluation of resource management action and minimizes misunderstanding among affected and interested parties.

2.4 Consultation, Cooperation, and Coordination. Monitoring programs should include appropriate consultation, cooperation, and coordination with the rangeland users, general public, advisory boards and councils, landowners, extension service, academia, private organizations, and local, State, and Federal agencies as monitoring plans are prepared, administered, and revised. The credibility of the monitoring program is enhanced by direct involvement by users and other interested parties in preparation of monitoring plans, collection of studies data, and in subsequent evaluations based on these data. Measures should be taken, as appropriate, (field days, meetings, etc.) to ensure active and meaningful participation by affected and interested parties. All consultation, cooperation, and coordination should be documented.

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3. PRIORITY.

The BLM cannot intensively monitor the effectiveness of on-the-ground management actions on all the rangelands it administers because of funding and personnel constraints. Therefore, priorities concerning monitoring needs should be assigned by allotment, wildlife habitat area, herd management area, watershed area, or other designated management area. Following is a list of criteria that can be used, as appropriate, in assigning priorities.

- Land-use plan objectives (such as those for the three categories of allotments--maintain, improve, and custodial).
- Coordinated resource management plan objectives.
- Activity plan objectives.
- Intensity of planned management efforts.
- Current productivity.
- Current resource values.
- Current ecological status.
- Resource conflicts/controversy (known and anticipated).
- Significance of unresolved issues.
- Present and future management.
- Known or anticipated changes in grazing management.
- Potential for improvement.
- Potential for economic return on investment.
- Socio-economic situations.
- Special/unique situations (example: crucial habitat).
- Threatened, endangered, or sensitive species habitat.
- Status of range improvements (lacking, adequacy, maintenance).

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4. TRAINING.

The objective of monitoring training is to provide consistency and reliability in collecting and evaluating data. Examiners collecting data should have a basic understanding of the entire data collection, analysis, evaluation, and decisionmaking process. Such an understanding promotes a greater appreciation for the emphasis on uniformity, accuracy, and reliability of monitoring studies data and for decisions based on these data. Examiners should understand why they are collecting the data and how the data will be used.

4.1 Beginning-of-Field Season Training. Training should be provided annually at the beginning of the field season for all examiners involved in collecting studies data. Annual training applies not only to initial training for new and/or inexperienced examiners but also to review and recalibration training for experienced examiners.

4.11 Training Location. Training should take place in the field to ensure that the detailed procedural instructions relate directly to the rangelands of concern.

4.12 Equipment and Supplies. Examiners should be familiar with the equipment and supplies used to collect the data, including forms, frames, and cameras.

4.13 Studies Location and Data Documentation. Examiners should be familiar with and understand the studies documentation procedure prescribed by the authorized officer. As a follow-up to training, study data collected in any one year should be checked to see that the desired data have been collected and properly recorded.

4.14 Instructors. Training should be conducted by qualified BLM personnel with assistance from outside the BLM, as appropriate.

4.2 Training During Field Season. Periodic review and/or recalibration during the field season may also be necessary to maintain consistency among examiners and to account for phenological changes. Review and recalibration is especially important where study methods require estimates rather than measurements for collecting data.

5. SAMPLING.

In the study of rangelands it is impossible to measure or count everything. Therefore, samples are taken on part of the population under study and conclusions about the characteristics of the population are drawn from characteristics of the samples. Sampling should be appropriate to the identified need based on established objectives for the area. The number of samples needed to achieve the desired confidence level and precision should be determined. Time and cost per sample will influence the number of samples that can be collected.

5.1 Intensity of Sampling. Factors to be considered in determining the intensity of sampling are: complexity or sensitivity of known or anticipated resource use conflicts or controversy, intensity of on-the-ground management, diversity of vegetation types, present ecological status, trend, and the desired level of precision. Intensity of sampling is dependent on the kind, quality, and quantity of data needed at each site. The stratification, key area, and key species concepts can be used, as appropriate, in selecting study sites where data will be collected. Stratification and selection of key areas are critical and if not done properly can ultimately lead to the failure of a monitoring program. In determining the intensity of sampling, the authorized officer should weigh the desired level of monitoring against funding and personnel capabilities. Professional judgment plays a major role in making these determinations.

5.11 Stratification. Stratification is a means of dividing an area of rangeland into smaller, more homogeneous units. Thus, allotments, pastures, wildlife habitat areas, herd management areas, watershed areas, or other designated management areas may be divided into areas having similar characteristics. Strata may be pastures within an allotment subjected to similar grazing uses, or areas having similar vegetation, comparable soils, or uniform topography. Stratification should be done by a person who is knowledgeable of the area. Multiple-use coordination and participation by interested parties should be solicited in completing the stratification of any rangeland area. (See Sections 2.2 and 2.4.)

a. Size of Strata. Strata may be any size depending on the intensity or detail of the stratification. Good maps and aerial photographs are essential in mapping strata.

b. Criteria for Stratification. Following are some criteria that can be considered in stratification:

(1) Vegetation Type. Existing plant communities are primary criteria for stratifying rangelands. Each major vegetation type may be a stratum.

(2) Range Sites. Range sites with their specific plant associations and specific physical site characteristics may be used as criteria for stratifying rangelands. Each range site may be a stratum.

(3) Present Ecological Status. Present ecological status of the range sites, or portions of range sites, may be used as a basis for stratification.

(4) Soils and Topography. Soil, topographic, and environmental differences are usually expressed in the vegetation type. However, in some cases, soil and topography may be more significant than vegetation in stratifying such areas as fragile watershed, critical areas, etc.

(5) Grazing Systems. Areas subjected to similar grazing treatment under implemented grazing systems may be considered in stratification.

(6) Utilization Patterns. Grazing utilization patterns (use zones) are often well defined. These patterns can play a key role in stratifying rangelands as well as in locating key areas. (See Section 4, Technical Reference 4400-3.)

(7) Critical Areas. Each critical area may be considered as a separate stratum. If necessary, large critical areas may be further stratified using other criteria.

(8) Range Readiness. Under certain grazing systems, rangeland readiness may be an important stratification consideration. Stratification may be based on seasonal use areas such as spring rangeland, summer rangeland, etc.

(9) Suitability. Although topography may be used as a separate criterion for stratification, suitability of rangelands for use by different grazing animals can also be used in stratifying these lands.

(10) Threatened, Endangered, and Sensitive Species Habitat. In some cases, habitat for threatened, endangered, and sensitive plant and animal species may be an important consideration in stratifying an area.

5.12 Key Areas. Key areas are indicator areas that have the capability to reflect what is happening on the strata they represent as a result of on-the-ground management actions. Depending on the management objectives, a key area may be a representative sample of a large stratum, such as a pasture, allotment, etc., or it may be a representative sample of a small stratum having important grazing value, such as a heavy use area near water, a riparian zone, etc. A key area could also be a representative sample of a sensitive or critical area, such as a fragile watershed, sage grouse nesting ground, etc. Key areas may represent the "pulse" of the rangeland (pasture, allotment, wildlife habitat area, herd management area, watershed area, etc.) or they may represent only specific areas. Monitoring studies are located within key areas.

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a. Selecting Key Areas. Selection of key areas is tied directly to land use, coordinated resource management, and/or activity plan objectives. Proper selection of key areas is critical to the success of a monitoring program. Where justified, an interdisciplinary team may be used to select these areas. In addition, permittees, lessees, and other interested parties outside the BLM may be invited to participate, as appropriate, in the selection of key areas. (See Sections 2.2 and 2.4.) Poor information resulting from improper selection of key areas can result in misguided decisions and improper management. Some of the site characteristics and other information that may be considered in the selection of key areas are:

(1) Soil.

(2) Vegetation (kinds and distribution of plants).

(3) Range sites.

(4) Ecological status.

(5) Topography.

(6) Location of water, fences, and natural barriers.

(7) Size of pasture.

(8) Kind and/or class of foraging animals - livestock, wildlife, wild horses, wild burros.

(9) Habits of the animals, including foraging.

(10) Areas of animal concentration.

(11) Location and extent of critical areas.

(12) Erosion conditions.

(13) Threatened, endangered, and sensitive species - both plant and animal.

(14) Periods of animal use.

(15) Grazing history.

(16) Location of salt, mineral, and protein supplements.

(17) Location of livestock, wildlife, wild horse, and/or wild burro trails.

b. Criteria for Selecting Key Areas. Following are some criteria that should be considered in selecting key areas. A key area:

(1) Should be representative of the stratum in which it is located.

(2) Should be located within a single range site and present plant community.

(3) Should contain the key species or have the potential to produce the key species.

(4) Should be foraged by livestock, wildlife, wild horses, and/or wild burros when the pasture, allotment, etc., is used.

(5) Should be capable of and likely to show response to management actions. This response should be indicative of the response that is occurring on the stratum.

(6) May be selected to represent special or unique situations such as a riparian zone, fragile watershed, heavily grazed area, or crucial or important area.

c. Number of Key Areas. The number of key areas which are selected to represent a stratum depends on the size of the stratum and on data needs but may ultimately be limited by funding and personnel constraints. If stratification is appropriate, one key area in each stratum may be adequate. Additional key areas may be selected, as appropriate.

d. Mapping Key Areas. Key areas should be accurately delineated on aerial photos and/or maps. Mapping key areas will provide a permanent record of their location. (See Section 6.)

5.13 Key Species. Key species are generally an important component of a plant community. Key species serve as indicators of change and may or may not be forage species. More than one key species may be selected for a stratum depending on management objectives and data needs. In some cases, problem plants (poisonous, etc.) may be selected as key species.

a. Selecting Key Species. Selection of key species should be tied directly to management objectives in land-use, coordinated resource management, and activity plans. This selection is dependent upon the plant species in the present community, the present ecological status, and the potential natural community for the specific sites. Selection of key species may be guided by the objective of reestablishing a desirable species within a plant community. An interdisciplinary team should be used, as appropriate, in selecting key species to ensure that data needs of the various resources are met. In addition, interested parties outside the BLM are invited to participate, as appropriate, in selecting these species. (See Sections 2.2 and 2.4.)

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b. Considerations in Selecting Key Species. The following points should be considered in selecting key species:

(1) The foraging use of the key species on key areas is assumed to reflect foraging use on the entire stratum.

(2) Changes in density, frequency, reproduction, etc., of key species on key areas are assumed to reflect changes in these species on the entire stratum.

(3) A key species is often relatively abundant and tolerant to moderate grazing.

(4) Depending on the selected management and/or periods of use, key species may be foraged during the growing period, after maturity, or both.

(5) Overuse of a key species can have a significant effect on wildlife, wild horse, or wild burro habitat, watershed condition, grazing capacity, scenic value, water quality, or other resource values.

(6) The forage value of key species may be of secondary or no importance. For example, watershed protection may require selection of plants as key species which protect the watershed but are not the best forage species. In some cases, threatened, endangered, or sensitive species which have no particular forage value may be selected as key species.

(7) In areas of yearlong grazing use and in areas where there is more than one use period, several key species may be selected to determine utilization. For example, on an area with both winter and summer grazing use, a cool season plant may be the key species during the winter and a warm season plant may be the key species during the summer.

(8) Selection of several key species may be desirable when adjustments in livestock grazing use are anticipated.

(9) If the objective is to maintain an advanced seral community, the key species should be a major component of that community.

c. Key Species on Depleted Rangelands. The key species selected should be present, or potentially so, on each key area on which monitoring studies are conducted; however, on depleted rangelands these species may be sparse or absent.

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(1) Key Species Sparse. Plants of the key species may be so sparse that they are found only on protected sites. When this is true, determine whether the greatest benefit can be achieved by improving and perpetuating or by sacrificing these species. If the species are the best plants for the area and their restoration is economically feasible, management should be based on increasing these species until they are a major component of the plant community. This may involve a severe change in grazing intensity and/or period(s) of use.

(2) Key Species Absent. If a key area does not include any plants of the key species because of severe depletion, it may be necessary to conduct monitoring studies on other species that comprise the bulk of the forage. Data gathered on non-key species must be interpreted on the basis of effects on the establishment and subsequent response of the key species. If the key species does not respond favorably to the selected management system and does not appear on the key area within a reasonable length of time, the reason for its absence might be determined by analysis of data gathered on other forage species. For example, a high percent utilization on non-key species during the critical growth period of the key species may reflect a high utilization on young plants of the key species, thereby curtailing their establishment. Conversely, heavy use during a critical growth period of non-key species may eliminate the competition and provide a desirable environment for accelerated reestablishment of the key species.

5.2 Selecting Sampling Methods and Sampling Designs. There are a variety of sampling methods and sampling designs that can be used to collect data to monitor the effectiveness of on-the-ground management actions and to evaluate progress toward meeting management objectives.

5.21 Basic Sampling Methodologies. Technical References 4400-2, 3, and 4 describe some basic actual use, utilization, and trend study methods. As monitoring plans are developed, methods should be selected which will provide the needed data. Care must be exercised in the selection of monitoring study methods to ensure that they are suitable for the vegetation types and resource conditions that will be encountered. The capability of the study methods to detect subtle changes due to management over short periods of time should be carefully considered.

5.22 Other Sampling Methodologies. Variations from the methods or combinations of methods described in Technical References 4400-2, 3, and 4 should be thoroughly described in monitoring plans. Variations and/or combinations should receive a thorough review as they are developed and adopted.

5.23 Sampling Designs. The format for the analysis of study data is dependent on the kind of data collected, study layout, and the number of transects/plots. (See Section 5.4.) The following factors should be considered in selecting a sampling design.

a. Use of several short transects may be more advantageous than one long transect.

b. Randomization at some stage in a sampling design is advised for most statistical tests to be valid. Randomization allows for an unbiased estimate of error and permits establishment of confidence limits.

c. Every effort should be made to minimize bias and error and to increase precision. Precision can be increased by reducing internal variation and increasing sample size.

5.3 Changes in Sampling. For monitoring study data to be meaningful and useful over time, there must be consistency in the kinds of data that are collected and the manner in which they are collected. However, the need for changes in sampling may occasionally arise when problems are detected during a cursory review of the collected data, when analyzing and interpreting the data, or when conducting an evaluation. If problems occur, certain factors, such as stratification, location of key areas, key species, study methods, examiners, training, and time of year of data collection, should be reexamined. In some cases, problems can be corrected without making significant changes; on the other hand, there may be instances where substantial changes are needed. Serious consideration must be given to the effect changes will have on the historical value of existing data. Will changes mean starting all over again or will they complement existing studies data?

5.31 Changing Stratification/Key Areas. Changes in stratification and location of key areas may sometimes be necessary. Such changes are warranted if key areas are improperly located or changes occur in management and grazing use patterns. The consequences of changing stratification and key areas should be carefully considered.

5.32 Changing Sampling Methods. Sampling methods should not be changed without justification. Changes should be made only after an evaluation of the data shows that the existing sampling method is not providing the desired data. All changes in sampling methods should be documented and approved.

5.33 Changing Sampling Design. Changing parts of the sampling design, such as number of samples, sampling interval, frame size, length of transect, etc., should be carefully evaluated. Changes should be made only after determining that the present sampling design is not providing the desired data. All changes in sampling design should be thoroughly documented and approved.

5.4 Sampling Precision and Accuracy. Under a monitoring program, measurements, estimates, and/or other observations are obtained by sampling vegetation attributes within a key area. Sampling designs may be based on statistical considerations such as random and unbiased sampling. The proper use of statistical methods allows probabilistic statements to be made about the measurements, estimates, and/or observations obtained. If statistical methods will be an integral part of sampling and analysis, sampling design and intensity can be tailored to provide the needed data. It is important to be able to determine the precision and accuracy of the samples taken. This does not mean that in all cases a fixed probability level must be achieved (i.e., 80 percent ± 20 percent). Suggested references are Barrett and Nutt (1979), Freese (1962, 1967), and Zar (1974). The timely discussion found in McQuisten and Gebhardt (1983) is also recommended reading. (See BIBLIOGRAPHY.)

6. RETAINING MONITORING STUDIES DATA.

A significant amount of funding and manpower have been expended and will be expended in the future for collecting monitoring study data. Each field office should have a plan for filing, storing, and retaining the data which have been collected. In addition, the plan should provide for recording the location and description of the specific study sites. Monitoring study data collected over a period of years will be important to resource management in the future. Even where studies are discontinued, the data and the record of study locations should be retained.

7. MONITORING PLANS.

Monitoring plans are prepared to provide for the orderly and periodic collection of study data needed to make management decisions, determine the effectiveness of on-the-ground management actions, and evaluate progress toward meeting management objectives. Monitoring plans should provide for proper stratification, correct implementation of selected study methods, adequate sampling, and logical analysis, interpretation, and evaluation of data. The rationale/justification for selecting the particular course of action with respect to these items should be documented in the plans. These plans should be prepared in careful and considered consultation with all affected parties and interests both within and outside the BLM.

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7.1 Identifying Areas to be Covered by Monitoring Plans. The authorized officer should determine the most appropriate area to be covered by a monitoring plan. This area may be a Resource Area, the area covered by a resource management plan/environmental impact statement, a coordinated resource management plan, an activity plan, or other area, as specified.

7.2 Essential Components of Monitoring Plans. The basic components of a monitoring plan are:

- What data need to be collected.
- How the data will be collected.
- Why the specific sampling methods were selected to collect the data.
- Where studies will generally be located.
- Where data will be filed and stored.
- When studies will be established, read, and evaluated (schedules).
- Who (which position) has responsibility for collecting data, providing training, providing quality control, evaluating studies and other data, and administering the monitoring program to see that it is carried out as planned. The plan should identify non-BLM people who may have accepted responsibilities relative to the monitoring plan.

7.3 Preparing Monitoring Plans. The following guidance can be used in preparing monitoring plans which will encourage an orderly and comprehensive approach to resource monitoring. While this guidance is not intended to be all inclusive, it covers many of the essential elements that should be considered in preparing monitoring plans. If any of the elements are described elsewhere, such as in land-use, coordinated resource management, and activity plans or other documents, cross reference the appropriate document; do not duplicate information available in other documents. The plans should be tailored to fit the needs of the areas covered by the plans.

7.31 Interdisciplinary, Public, and Other Coordination. Measures should be taken to encourage appropriate interdisciplinary participation; general public, academic, extension service, and user involvement; and inter-area/District/State coordination in the preparation of monitoring plans. (See Sections 2.2 through 2.4.) Monitoring plans should explain both the coordination that has occurred and the coordination that is planned for the future.

7.32 Description of Area Covered by Plan. The area covered by a monitoring plan should be briefly described. The description should include general geographical, physical, and biotic characteristics of the area.

7.33 Management Objectives and Monitoring Priority.

a. Management Objectives. Management objectives are planned results for allotments, wildlife habitat areas, herd management areas, watershed areas, or other designated management areas. Objectives should relate to resource attributes that can be monitored and that are sensitive indicators of change. Objectives should:

- be simple and understandable,

- be measurable and quantifiable,

- be realistic, and

- have time periods for completion.

(1) Management objectives may be of a general nature until the initial data have been collected, after which, the objectives may be refined. Objectives may need to be modified from time to time based on the accession of data which supplement previously existing data.

(2) Management objectives are categorized as short-term objectives or long-term objectives. In particular, objectives relating to utilization tend to be short-term in nature, while objectives relating to trend in ecological status or resource value rating tend to be long-term.

b. Monitoring Priority. A priority concerning monitoring needs should be assigned to each allotment, wildlife habitat area, herd management area, watershed area, or other designated management areas. Where planning was completed without assigning managment priorities among allotments or groups of allotments under the selective management approach, categorizing allotments (maintain, improve, custodial) when monitoring plans are prepared may help to establish the priority for monitoring on an allotment basis. (See Section 3.)

7.34 Study Methods to be Used.

a. Existing Studies. Study methods used for previously established studies should be described in detail, or a reference should be made to an existing description in a technical reference or publication, another monitoring plan, or other document. If reference is made to an existing description, any variations from that description should be explained.

(1) Ground Rules. Any "ground rules" unique to the area covered by a monitoring plan should be explained. These "ground rules" may address such things as: differentiating between dead and live portions of sod-forming plants, determining what constitutes a plant for rhizomatous and sod-forming plants, and how annuals will be considered in the studies.

(2) Continuing Existing Studies. The monitoring plan should include a brief explanation of how data collected with existing study methods will or will not satisfy identified monitoring needs. The rationale/ justification for continuing to use existing study methods should be documented. (See Section 5.2.)

(3) Discontinuing Existing Studies. Rationale for discontinuing existing study methods should be included in the monitoring plan. (See Section 5.3.)

(4) Retaining Data from Discontinued Studies. Provisions to retain data from discontinued studies should be explained. (See Section 6.)

b. New Studies. Study methods that will be used for new studies should be described in detail, or a reference should be made to an existing description in a technical reference or publication, another monitoring plan, or other document. If reference is made to an existing description, any variations from that description should be explained. Specific details that may be described are: minimum number of samples, size of frame(s), interval between samples, and how many plants will be sampled for utilization. Explain the "ground rules" as they apply to the study methods. (See Section 7.34a(1).) Rationale/justification for using the selected study methods should be documented. (See Section 5.2.)

7.35 Studies Location and Data.

a. Studies by Management Area. All studies which will be conducted on each allotment, wildlife habitat area, herd management area, watershed area, or other designated management area should be listed. The amount of detail necessary will vary from area to area. In some cases a brief list of studies may suffice, while in other cases, descriptions of study locations may be necessary. Where appropriate, any statistical considerations such as number of samples and desired confidence levels should be described. (See Section 5.4.)

b. Study Sites. Any special or unique criteria that will be used in the selection of key areas and/or key species should be explained. Rationale/justification for selecting study sites should be documented. In some cases, consideration may be given to locating study sites where studies will provide data concerning the effects of continuing the existing management actions as well as the effects of newly implemented or future management actions.

c. Data Records and Storage. The plan should explain how and where data are to be recorded, filed, and stored. It should discuss any computer capability that may be used. The disposition of field data forms and provisions for permanent storage of data should be documented. (See Section 6.)

d. Marking Study Site Locations. Every effort should be made to establish uniformity in marking study locations in the field and in documenting study locations in the office. Locating established study sites is often very time-consuming and good location documentation can greatly decrease the time spent in this effort.

e. Photographic Records. The plan should describe the extent to which photographs will be used, taking into consideration such items as prints vs. slides, color vs. black and white film, close-up and general view photographs, and the direction from which photographs should be taken. It should explain how photographs will be stored as part of the permanent monitoring records. (See Section 6.)

7.36 Studies Schedule.

a. Establishing and Reading Studies. A study schedule should specify when studies are to be established and read. The monitoring plan should identify the position(s) responsible for these tasks. The plan should also identify parties outside the BLM who have accepted responsibility for collecting studies data.

b. Priority for Conducting Studies. Where unforeseen circumstances prevent completion of planned work, refer to the priority list in the monitoring plan. This list indicates the order in which studies should be completed by allotment, wildlife habitat area, herd management area, watershed area, or other designated management area. In situations where all the work cannot be completed, the studies that are established and/or read, should be done to the standard called for in the monitoring plan. It is not advisable to try to complete all the scheduled work, if part or all of it has to be done below standard.

c. Progress Reporting. Study schedules can be used as records of accomplished and unfinished work. Schedules can prevent some studies from being inadvertently overlooked.

d. Workload. Studies schedules reflect the monitoring program workload for Resource Areas and are useful in preparing annual work plans. These schedules, along with other elements in monitoring plans, are valuable in preparing requests for the funding and manpower needed to accomplish the desired level of monitoring.

7.37 Analysis, Interpretation, and Evaluation. The monitoring plan should include a discussion of data analysis, interpretation, and evaluation, and should identify any computer programs or programs for programmable calculators that will be used. The plan should describe other data that may be used in the evaluation, including data collected by non-BLM parties. Provisions may also be made for any desired peer review of the analysis, interpretation, and evaluation. The plan may identify the format to be used for presenting results of interpretation and evaluation. An explanation of how wildlife, watershed, and other resource data will be incorporated into an evaluation should be included in the plan.

7.38 Training for Monitoring. The monitoring plan should specify what type, how much, when, and by whom training will be provided. Provisions should be made for training new personnel as well as providing refresher and recalibration sessions for previously trained personnel. (See Section 4.) If parties outside BLM are responsible for collecting study data, they should receive appropriate training by BLM.

GLOSSARY OF TERMS

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actual use: a report of the actual livestock grazing use certified to be accurate by the permittee or lessee. Actual use may be expressed in terms of animal unit months or animal months. (See 43 CFR 4100.0-5.)

allotment: an area of land designated and managed for grazing of livestock. Such an area may include intermingled private, State, or Federal lands used for grazing in conjunction with the public lands. (See 43 CFR 4100.0-5.)

allotment management plan (AMP): a documented program which applies to livestock grazing on the public lands, prepared in consultation, cooperation, and coordination with the permittee(s), lessee(s), or other involved affected interests. (See 43 CFR 4100.0-5.)

analysis: (1) a detailed examination of anything complex in order to understand its nature or determine its essential features; or (2) a separating or breaking up of any whole into its component parts for the purpose of examining their nature, function, relationship, etc. (A rangeland analysis includes an examination of both biotic (plants, animals, etc.) and abiotic (soils, topography, etc.) attributes of the rangeland.)

authorized officer: any person authorized by the Secretary of the Interior to administer the BLM's rangeland management program. (See 43 CFR 4100.0-5.)

-C-

community: an assemblage of populations of plants and/or animals in a common spatial arrangement.

critical area: an area which must be treated with special considerations because of inherent site factors, size, location, condition, values, or significant potential conflicts among uses. Critical area is synonymous with crucial area.

crucial area: (See critical area.)

-D-

density: numbers of individuals or stems per unit area. (Density does not equate to any kind of cover measurement.)

-E-

ecological site: (See range site.)

ecological status: the present state of vegetation of a range site in relation to the potential natural community for the site. Ecological status is use independent. It is an expression of the relative degree to which the kinds, proportions, and amounts of plants in a community resemble that of the potential natural community. The four ecological status classes correspond to 0-25, 26-50, 51-75, or 76-100 percent similarity to the potential natural community and are called early seral, mid seral, late seral, and potential natural community, respectively.

endangered species: any species which is in danger of extinction throughout all or a significant portion of its range.

evaluation: (1) an examination and judgment concerning the worth, quality, significance, amount, degree, or condition of something; or (2) the systematic process for determining the effectiveness of on-the-ground management actions and assessing progress toward meeting management objectives.

-F-

frequency: a quantitative expression of the presence or absence of individuals of a species in a population. It is defined as the percentage of occurrence of a species in a series of samples of uniform size.

-G-

goal: the desired state or condition that a resource management policy or program is designed to achieve. A goal is usually not quantifiable and may not have a specific date by which it is to be completed. Goals are the base from which objectives are developed. (See objective.)

-I-

interpretation: explaining or telling the meaning of something and presenting it in understandable terms.

inventory: the systematic acquisition and analysis of information needed to describe, characterize, or quantify resources for land-use planning and management of the public lands.

-K-

key area: a relatively small portion of a rangeland selected because of its location, use, or grazing value as an area on which to monitor the effects of grazing use. It is assumed that key areas, if properly selected, will reflect the effects of current grazing management over all or a part of a pasture, allotment, or other grazing unit.

key species: (1) those species which must, because of their importance, be considered in a management program; or (2) forage species whose use serves as an indicator to the degree of use of associated species.

-M-

monitoring: the orderly collection, analysis, and interpretation of resource data to evaluate progress toward meeting management objectives.

-O-

objective: planned results to be achieved within a stated time period. Objectives are subordinate to goals, are narrower and shorter in range, and have increased possibility of attainment. Time periods for completion and outputs or achievements that are measurable and quantifiable are specified. (See goal.)

-P-

pasture: grazing area enclosed and separated from other areas by fence or natural barrier.

potential natural community (PNC): the biotic community that would become established if all successional sequences were completed without interferences by man under the present environmental conditions. Natural disturbances are inherent in development. Includes naturalized non-native species.

public lands: any land and interest in land outside of Alaska owned by the United States and administered by the Secretary of the Interior through the Bureau of Land Management. (See 43 CFR 4100.0-5.)

-R-

rangeland: a kind of land which supports vegetation useful for grazing on which routine management of that vegetation is through manipulation of grazing rather than cultural practices. (Rangelands include natural grasslands, savannas, shrublands, most deserts, tundra, alpine communities, coastal marshes, riparian zones, and wet meadows. Rangeland includes lands revegetated naturally or artificially to provide a plant cover which is managed like native vegetation.)

range site: a kind of rangeland with a specific potential natural community and specific physical site characteristics, differing from other kinds of rangeland in its ability to produce vegetation and to respond to management. Range sites are defined and described with soil, species composition, and production emphasis. Range site is synonymous with ecological site.

resource value rating (RVR): the value of vegetation present on a range site for a particular use or benefit. Resource value ratings may be established for each plant community capable of being produced on a range site, including exotic or cultivated species. On a given range site, each use (or potential use) has a separate resource value rating because that rating is based on classification of plants according to their value for a specific use. Some examples: A resource value rating for forage useful for cows and calves during the spring grazing season could be based on proper use factors (PUF's) or a more general assigning of plant species to good, moderate, or poor categories of forage value. Resource value ratings could then be based on production, cover, density, or frequency of plants in the different categories. A resource value rating for cover useful for a pronghorn fawning area might be based on density or cover of plants of a certain height or size class, without regard to plant species. A resource value rating related to scenic beauty might be based on abundance of flowering species, species with fall color, evergreens, diversity of growth forms, etc.

-S-

seral community: one of a series of biotic communities that follow one another in time on any given area. Seral community is synonymous with seral stage, successional community, and successional stage.

seral stage: (See seral community.)

stratification: subdividing an area into units which are, more or less, internally homogeneous with respect to the (those) characteristic(s) of interest.

succession: the orderly process of community change; it is the sequence of communities which replace one another in a given area.

successional community: (See seral community.)

successional stage: (See seral community.)

-T-

threatened species: any species which is likely to become an endangered species within the forseeable future throughout all or a significant portion of its range.

trend: the direction of change in ecological status or in resource value ratings observed over time. Trend in ecological status is described as "toward" or "away from" the potential natural community or as "not apparent." Appropriate terms are used to describe trend in resource value ratings. Trends in resource value ratings for several uses on the same site at a given time may be in different directions, and there is no necessary correlation between trends in resource value ratings and trend in ecological status.

-U-

use: (See utilization).

utilization: the proportion or degree of current year's forage production that is consumed or destroyed by animals (including insects). May refer either to a single plant species, a group of species, or to the vegetation as a whole. Utilization is synonymous with use.

-V-

vegetation: plants in general, or the sum total of the plant life above and below ground in an area.

vegetation type: a kind of existing plant community with distinguishable characteristics described in terms of the present vegetation that dominates the aspect or physiognomy of the area.

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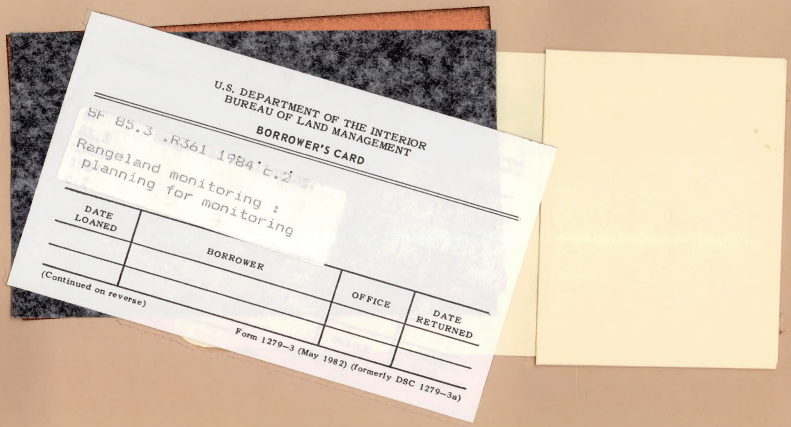
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